Attorney Docket # 5267-49DIV

Patent

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of
Masashi SHIRAISHI et al.
Serial No.: 09/506,224
Filed: February 17, 2000
For: Magnetic Head Device

Examiner: Tugbang, Anthony D.
Group Art: 2752

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Edward M. Weisz
Name of applicant, assignee or Registered Representative

Signature

May 5, 2004
Date of Signature

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APPEAL BRIEF

SIR:

This is an appeal, pursuant to 37 C.F.R. §1.192(a), from the decision of the Examiner in the above-identified application, as set forth in the final Office Action wherein the Examiner finally rejected appellants' claims. The rejected claims are reproduced in the Appendix A attached hereto. A Notice of Appeal was mailed on November 11, 2003. This Appeal Brief is being submitted in triplicate.

The fee of $330.00 for filing an Appeal Brief (Large Entity) pursuant to 37 C.F.R. §1.17(f) is submitted herewith. Any additional fees or charges in connection with this application may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

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REAL PARTY IN INTEREST

The assignee, TDK Corporation, is the real party in interest in the above-identified U.S. Patent Application.

RELATED APPEALS AND INTERFERENCES

There are no other appeals and/or interferences related to the above-identified application at the present time.

STATUS OF CLAIMS

Claims 1-29 are pending. Claims 1-12 and 19-23 have been withdrawn. Claims 13-18 and 24-29 have been rejected and are on appeal.

STATUS OF AMENDMENTS

There have been no Amendments filed subsequent to the final Office Action.

An Amendment was filed on February 25, 2003 in response to an August 16, 2002 Office Action and has been entered. In response, on May 13, 2003 the Examiner issued a final Office Action maintaining the rejection of the pending claims.

SUMMARY OF THE INVENTION

Appellants' invention is directed to methods of fabricating a magnetic head device 17 shown in Fig. 1 relative to magnetic recording disc 10. The magnetic head device 17 includes a suspension structure 18 having one end that supports a slider 19, as explained on p. 3, lines 31-33 of the specification. As shown in Fig. 2, the slider 19 has a magnetic head element that is used to access a rotating magnetic recording disc 10 for writing and/or reading data on the disc. A head IC chip 20 is mounted on the suspension structure so as to face the magnetic recording disc, which spins at least when the head IC chip is in operation. (See p. 12, lines 22-31 of the specification). In this arrangement the head IC chip 20 is always exposed to a flow of air produced by rotation of the

disc 10 so that the head IC chip is continuously cooled by the flow of air at least when such chip is in operation. (See p. 16, line 31 - p. 17, line 6 of the specification).

In prior art devices, heat generated by the flow of writing current in the head IC chip limits the efficiency at which data can be recorded on the recording disc. As a result, it is desirable for the head IC chip to be cooled so that the heat generated therein can be readily dissipated.

In accordance with independent claims 13, 18 and 29 of the present invention the head IC chip is mounted facing the magnetic disc and the mounting position is selected "to be located where the head IC chip is always exposed to a flow of air produced by rotations of the magnetic disc so that the head IC chip is continuously cooled by the flow of air". The method of claim 29 includes the additional step of "arranging for the head IC chip to be located with respect to the magnetic disc with a distance between opposing surfaces of the head IC chip and the magnetic disc smaller than 1000 μm".

ISSUES

1. Whether claims 13, 14, 17 and 18 are patentable under 35 U.S.C. 102(b) in view of either U.S. Patent No. 5,014,145 ("Hosokawa"), or Japanese Patent Publication JP 6-195668) (hereinafter "JP '668")?

2. Whether claims 13, 14, 16-18, 24, 25, 27, 28 and 29 are patentable under 35 U.S.C. 103(a) in view of the combination of either Hosokawa and U.S. Patent No. 4,443,824 ("Frater"), or the combination of JP '668 and Frater?

3. Whether claims 15 and 26 are patentable under 35 U.S.C. 103(a) in view of the combination of either Hosokawa, Frater and U.S. Patent No. 3,832,769 ("Olyphant") or the combination of JP '668, Frater and Olyphant?

GROUPING OF CLAIMS

The pending claims are claims 13-18 and 24-29. Claims 13, 18 and 29 are independent claims. The remaining claims depend directly or indirectly from claim 13.

Group I -- claims 13-18, and 24-29, which stand or fall together.

ARGUMENT

CLAIMS 13, 14, 17 AND 18 ARE NOT ANTICIPATED BY EITHER HOSOKAWA OR JP '668

Under Section 35 U.S.C. §102(b) a person is entitled to a patent unless --

> "the invention was patented or described in a printed publication in this or a foreign country ... more than one year prior to the date of the application for patent in the United States".

"[A] claim is anticipated if each and every limitation is found either expressly or inherently in a single prior art reference." *Celeritas Technologies Ltd. v. Rockwell International Corp.*, 150 F.3d 1354, 1360, 47 USPQ2d, 1516, 1522 (Fed. Cir. 1998), *cert. denied*, 525 U.S. 1106 (1999), *citing Structural Rubber Prods. Co. v. Park Rubber Co.*, 749 F.2d 707, 715, 23 USPQ 1264, 1270 (Fed. Cir. 1984). "[O]ne who seeks such a finding [of anticipation] must show that each element of the claim in issue is found, either expressly described or under principles of inherency, in a single prior art reference...". *Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 771-772, 218 USPQ 781, 789 (Fed. Cir. 1983), *cert. denied*, 465 U.S. 1026 (1984).

In the May 13, 2003 Office Action the Examiner relies on Hosokawa in rejecting claims 13, 14, 17 and 18 under 35 U.S.C. 102(b). Hosokawa discloses a head positioning system for supporting a data head used in a fixed magnetic disc drive. As shown in Figs. 2 and 3 of Hosokawa, a servo head arm 31 supports a flexible circuit 9. An amplifier 8 in the form of a packaged IC is mounted on the flexible circuit 9. Hosokawa makes no mention of heat dissipation or, for that matter, any thermal influence that the packaged IC amplifier 8 may exert on the

magnetic head 1. Not surprisingly, therefore, there is no teaching to counteract such thermal influence, e.g., by disclosing a desired mounting position for the IC amplifier 8. Regarding the packaged IC amplifier 8, Hosokawa states "amplifier 8 for amplifying servo signals is *mounted* on the servo head arm 31" (emphasis added). *See* Hosokawa, col. 3 lines 40-42. Nowhere else in Hosokawa is the mounting of the IC amplifier discussed. Consequently, nowhere in Hosokawa is the mounting location of the IC amplifier 8 discussed. It is also noteworthy that in Fig. 4 of Hosokawa the IC amplifier 8 is not mounted in a position facing the disc. (*cf.* the relative position of IC amplifier 8 to disc 7 in Fig. 4 of Hosokawa, on the one hand, to the relative position of IC chip 20 to disc 10 in Fig. 2 of the subject application, on the other hand).

On page 3, lines 5-6 of the May 15, 2003 final Office Action the Examiner points out that Fig. 2 of Hosokawa depicts an IC chip facing the magnetic disc (and located inside an outer periphery of the magnetic disc). Fig. 2 clearly conflicts with the depiction in Fig. 4 which shows that IC amplifier chip 8 is located far from the rotating disc 7 and is not facing the magnetic disc as required in claims 13 and 18 (and independent claim 29). Hosokawa does not refer to these two drawings as showing different embodiments. Therefore, the only logical inference is that both drawings show the same embodiment. If so, then does Hosokawa's chip 8 lie inside the outer periphery of the magnetic disc, or outside it? It is respectfully submitted that any objective reader of Hosokawa would regard Fig. 2 as showing a gross depiction, with the accurate depiction being the one with greater detail shown clearly in an enlarged view, namely that of Fig. 4. Thus, anyone with ordinary skill in the art would not glean from Hosokawa that chip 8 is facing the magnetic disc within its outer periphery. Moreover, even if accurate, this depiction in Fig. 2 appears to be merely coincidental with respect to the function of cooling the IC chip. The fact that a discrepancy exists between Fig. 2 and Fig. 4 -- which depict different views of the same embodiment -- indicates a lack

of possession of the present invention on the part of Hosokawa. Prior art must be considered in its entirety W.L. Gore & Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303, cert. denied 469 U.S. 851 (1984).

In contrast, independent claims 13 and 18 specifically recite the step of "mounting the head IC chip on the connecting device so as to face the magnetic device". Claims 13 and 18 also recite the step of "selecting the mounting position of the head IC chip on the connecting device to be located where the head IC chip is always exposed to a flow of air produced by rotations of the magnetic disc so that the head IC chip is continuously cooled by the flow of air at least when the head IC chip is in operation."

On page 3 of the final Office Action, the Examiner states that the limitations of "selecting the mounting position...operation" as found in claims 13 and 18 "have not been given any patentable weight and do not patentably further limit the claimed manufacturing method since these limitations only affect the operation of the magnetic disc device in a futuristic event, after fabrication, and not during the actual fabrication of the magnetic disc device." May 13, 2003 final Office Action, page 3, lines 13-16. Appellants respectfully disagree. The "selecting" steps of claims 13 and 18 recite where the head IC chip is mounted during fabrication, namely that the IC chip is to be mounted at a position where the IC chip will be exposed to a flow of air produced by the rotating magnetic disc. In other words, the IC chip is mounted at a position where the flow of air that will be produced by a rotating disc will impinge upon the IC chip so that the chip can be cooled by the then-generated air flow. That effect and where it occurs are both readily ascertainable so that they are already known during fabrication. Thus, the claim recitation is not some unknown arbitrary, unpredictable event. It is known, calculatable and experimentally predictable. Functional language does not, in and of itself, render a claim improper. *In re Swinehart,* 439 F.2d 210, 169

USPQ 226 (CCPA 1971). *See also* MPEP Sec. 2173.05(g) ("A functional limitation must be evaluated and considered, just like any other limitation of the claim, for what it fairly conveys to a person of ordinary skill in the pertinent art in the context of which it is used"). Thus, this step does patentably further limit the claimed method and must be considered in evaluating the patentability of the claims.

For all of the foregoing reasons, not each and every feature of claim 13 and its dependent claims 14-17 and 24-28 as well as independent claim 18, is expressly or inherently found in Hosokawa. Therefore, the Examiner's rejection of these claims under 35 U.S.C. §102(b) based on Hosokawa must be reversed.

Moreover, because independent claim 29, like claims 13 and 18, also includes the step of "mounting...so as to face the magnetic disc" and the step of "selecting the mounting position...operation", claim 29 is also not anticipated by Hosokawa.

In the May 13, 2003 final Office Action the Examiner also relied upon JP '668 in rejecting claims 13, 14, 17 and 18 under 35 U.S.C. 102(b). This reference discloses a magnetic head moving device for writing data to a disc. An English translation of JP '668 as obtained from the Japanese Patent Office website is attached hereto as Exhibit A. As disclosed in the English translation and with reference to Fig. 7 thereof, the device includes a pair of magnetic heads 5 and 6 positioned on either side of a floppy disc 7. Each magnetic head is controlled by a corresponding IC chip 28, 36. JP '668 does not discuss any desired mounting position of the IC chips 28 and 36. Rather in paragraph 15 it generally states that IC 28 "is the circuit element for signal amplification laid on the resist layer 26 in the portion in the middle of the length direction of the head carriage 1". It is clear from reading the English translation of JP '668 of Exhibit A that, contrary to the present invention, JP '668 is not concerned with the dissipation of heat generated by the IC chips 28 and 36.

Rather, it is concerned with reducing the effects of noise generated from the use of long flexible printed circuit boards. *See*, paragraphs 0007 and 0008 of Exhibit A. In other words, JP '668 teaches that locating the IC chips is dependent on factors other than convective cooling of the IC chips for heat dissipation. Moreover, JP '668 does not even discuss heat dissipation and the thermal influence of the IC 28 on the magnetic head 5 or the thermal influence of the IC 36 on the magnetic head 6. As expected, therefore, there is no teaching or suggestion on where the IC chips 28 and 36 should be mounted for convection cooling by air flow generated by rotation of the disc 7. In addition, and as shown in Fig. 7, neither IC 28 nor IC 36 is mounted "on the connecting device at a mounting position so as to face the magnetic disc" as is specifically required in the independent claims. In fact, even though IC chip 28 is mounted on a common side of arm 15 with disc 7 -- although not facing disc 7 -- IC chip 36 is mounted on an opposite side of arm 15 relative to disc 7. This clearly teaches away from the cooling of IC chip 36 by the air generated from the rotation of disc 7, inasmuch as such air would not impinge upon chip 36.

In summary, JP '668 does not teach the steps of "mounting the head IC chip on the connecting device at a mounting position so as to face the magnetic disc" and also does not teach the step of "selecting the mounting position of the head IC chip ... to be located where the head IC chip is always exposed to a flow of air ... so that the head IC chip is continuously cooled by the flow of air". Because these steps are not taught by JP '668, independent claims 13 and 18 (as well as claim 29) are not anticipated thereby. The Examiner's sole basis for supporting the rejection is Fig. 8. However, what Fig. 8 does or does not show as pertains to the present claimed invention is unclear. In fact, even the Examiner uses the indefinite descriptor "appears" (P. 3, line 11 of the Office Action). Moreover, it is too well established that drawings cannot be used to disclose specific dimensions and measurements without expressly stating those dimensions and

measurements. Thus, the Examiner's reliance on Fig. 8 of JP '668 is misplaced. Therefore, the Examiner's rejection of independent claims 13 and 18 (as well as claim 29) under 35 U.S.C. 102(b) based on JP '668 must be reversed.

Because claims 14-17 and 24-28 depend from claim 13, these claims are also not anticipated by JP '668 for at least the above reasons.

CLAIMS 13, 14, 16-18, 24, 25, 27 AND 28 ARE NOT RENDERED OBVIOUS BY THE COMBINATION OF HOSOKAWA AND FRATER, OR BY THE COMBINATION OF JP '668 AND FRATER

From the final Office Action, it is clear that the Examiner mistakenly assumes that the wording of appellants' claims 13, 14, 17 and 18 suggest appellants belief that "the operation of the magnetic disc device is somehow related to the fabrication of the magnetic disc device". May 13, 2003 final Office Action, p. 4, lines 1-2. The Examiner then relies on Frater to teach that rotating the magnetic disc during operation will expose the IC chip to the flow of air produced by the rotations of the magnetic disc. Appellants do not, however, "believe that the operation of the magnetic disc device is somehow related to the fabrication of the magnetic disc device". Rather, the inventive fabrication of the magnetic disc device in accordance with the present invention is to position the head IC chip where it will be exposed to a flow of air that will be generated from the rotations of a magnetic disc acted upon by the magnetic disc device. Appellants do not dispute that convection cooling of IC chips is known. However, what is not known, or obvious, is the mounting of the head IC chip in a position to efficiently utilize the air flow created from rotation of the magnetic disc for cooling.

In rejecting claims under 35 U.S.C. 103, the Examiner bears the initial burden of presenting a *prima facie* case of obviousness. *See In re Rijckaert*, 9 F.3d 1531, 1532, 28

USPQ2d 1955, 1956 (Fed. Cir. 1993). A *prima facie* case of obviousness is established by presenting evidence that would have led one of ordinary skill in the art to combine the relevant teachings to arrive at the claimed invention. *See In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988) and *In re Lintner*, 458 F.2d 1013, 1016, 173 USPQ 560, 562 (CCPA) 1972). A showing of obviousness must be clear and particular. *See, e.g., C.R. Bard, Inc. v. M3 Systems, Inc.*, 157 F.3d 1340, 1352, 48 USPQ2d 1225, 1232 (Fed. Cir. 1998). A broad conclusory statement regarding obviousness of modifying a reference, standing alone, is not evidence. *E.g., McElmurry v. Arkansas Power & Light Co.*, 995 F.2d 1576, 1578, 27 USPQ2d 1129, 1131 (Fed. Cir. 1993); *In re Sichert*, 566 F.2d 1154, 1164, 196 USPQ 209, 217 (CCPA 1977).

Turning now to Frater, this reference discloses a support structure 10 comprising two side walls configured as C-shaped channels 12 and 14 joined at a portion distal from the magnetic heads 44. Magnetic heads 44 mounted on further supports 38, 42 are supported at a bridge 18 at that proximal end of arm 10. Each C-shaped channel has a base formed with a series of apertures 68 provided for reducing the mass of the support structure 10. Two electronic modules 52 and 54 are affixed to the support structure 10 at its distal end from heads 44.

The Examiner argues, on page 6 of the final Office Action, that Frater teaches a specific mounting position of an IC chip "related to the location of the disc "so that air flow will surround the IC chip. It is "the Examiner's position ... that Frater does teach a mounting position of the IC chip such that the chip is exposed to a flow of air produced by the rotation of the magnetic disc to achieve heat dissipation." Appellants respectfully disagree. Although the apertures 68 allow air flow through the support structure 10, Frater does not disclose how the air flow is achieved. Cooling by air flow is well known. Thus, the key factor is not that air is used

as a cooling medium, but rather how and where the inventor locates the objects to be cooled so that they substantially benefit from air flow produced by the rotating magnetic disc. In actual fact, Frater is devoid of even a hint of relating the position of the IC chip relative to the air flow produced by the rotating disc.

From the structure disclosed in Frater, it is readily apparent that the electronic circuit modules are not mounted "so as to face the magnetic disc". Thus, air flow produced by the rotation of the disc cannot effectively reach the electronic circuit modules 52 and 54. The modules are simply located too far from the magnetic heads 44 and, therefore, from the magnetic disc. Also, Figs. 1 and 2 of Frater depict the circuit modules 52 and 54 mounted on an upper surface of the support structure main surface and the apertures 68 are formed in the C-shaped channel side walls below the upper surface of the support structure main surface. This arrangement further obstructs air flow from the apertures 68 to the modules 52 and 54. It is instructive to compare appellants location of the advantageously positioned IC chip 20 with respect to the magnetic disc and the location of the disc in Frater. Specifically, modules 52 and 54 of Frater are located well away from, and not facing, the rotating disc. Thus, Frater does not disclose selecting the location of the IC to effect its cooling by disc rotation.

As already discussed above, neither Hosokawa nor JP '668 addresses the problem of convection cooling of an IC chip by air produced from the rotation of a magnetic disc. Thus, even assuming one skilled in the art would be motivated to combine either of those references with Frater et al., such a combination still would not result in appellants' invention as recited in the independent claims, especially considering that Frater does not position modules 52 and 54 "so as to face the magnetic disc" and that the modules are not always exposed to a flow of air produced by rotations of the magnetic disc, as is specifically recited in the claims. For this

reason, the Examiner's rejection of claims 13, 14, 16-18, 24, 25 27, 28 and 29 under 35 U.S.C. 103(a) must be reversed.

CLAIMS 15 AND 26 ARE NOT RENDERED OBVIOUS BY THE COMBINATION OF EITHER HOSOKAWA OR JP '668 IN VIEW OF FRATER AND OLYPHANT

The Examiner has also rejected claims 15 and 26 as being obvious from the combination of certain references discussed above and further in view of Olyphant which, the Examiner has relied on solely for the position that flip chip bonding techniques are known in the art. Claim 15 depends from claim 13, and claim 26 depends from claim 24, which depends from claim 13. Because claim 13 is believed to be allowable for the reasons already discussed above, it is also believed that dependent claims 15 and 26 are also allowable. Therefore, the Examiner's rejection of claims 15 and 26 should be reversed.

CONCLUSION

For the foregoing reasons, it is respectfully submitted that all pending claims are neither anticipated nor rendered obvious by the art of record, and the Examiner's rejections should be reversed.

Respectfully submitted,
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APPENDIX

13. A method of fabricating a magnetic disc device comprising a magnetic head device including a slider having a magnetic head element and a suspension structure having one end supporting the slider, a head IC chip which is a separately-formed component from the slider, a rotatable magnetic disc which is rotated at least when the head IC chip is in operation, and an electrically conductive connecting device for establishing an electrical connection between the magnetic head element and the head IC chip, the method including the steps of:

mounting the head IC chip on the connecting device at a mounting position so as to face the magnetic disc; and

selecting the mounting position of the head IC chip to be located on the connecting device where the head IC chip is always exposed to a flow of air produced by rotations of the magnetic disc so that the head IC chip is continuously cooled by the flow of air at least when the head IC chip is in operation.

14. The method of claim 13 wherein the step of mounting the head IC chip on the suspension structure includes mounting the head IC chip which is a bare chip.

15. The method of claim 13 wherein the step of mounting the head IC chip on the suspension structure includes mounting the head IC chip on the suspension structure by flip-chip-bonding.

16. The method of claim 13 wherein the step of mounting the head IC chip on the suspension structure includes mounting the head IC chip which has a mass smaller than 1.0 mg.

17. The method of claim 13 wherein the step of selecting the mounting position of a head IC chip includes selecting the mounting position of the head IC chip so that the head IC chip is located inside an outer periphery of the magnetic disc at least when the head IC chip is in operation.

18. A method of increasing cooling of a head IC chip in a magnetic disc device comprising a magnetic head device including a slider having magnetic head element and a suspension structure having one end supporting the slider, a head IC chip which is a separately-formed component from the slider, a rotatable magnetic disc which is rotated at least when the head IC chip is in operation, and an electrically conductive connecting device for establishing an electrical connection between the magnetic head element and the head IC chip, the method including the steps of:

mounting the head IC chip on the connecting device at a mounting position so as to face the magnetic disc; and

selecting the mounting position of the head IC chip to be located on the connecting device where the head IC chip is always exposed to a flow of air produced by rotations of the magnetic disc so that the head IC chip is continuously cooled by the flow of air at least when the head IC chip is in operation.

24. The method of claim 13, further comprising:

arranging for the head IC chip to be located with respect to the magnetic disc with a distance between opposing surfaces of the head IC chip and the magnetic disc smaller than 1000 μm.

25. The method of claim 24 wherein the step of mounting a head IC chip on the suspension structure includes mounting the head IC chip which is a bare chip.

26. The method of claim 24 wherein the step of mounting a head IC chip on the suspension structure includes mounting the head IC chip on the suspension structure by flip-chip-bonding.

27. The method of claim 24 wherein the step of mounting the head IC chip on the suspension structure includes mounting the head IC chip which has a mass smaller than 1.0 mg.

28. The method of claim 24 wherein the step of selecting the mounting position of the head IC chip includes selecting the mounting position of the head IC chip so that the head IC chip is located inside an outer periphery of the magnetic disc at least when the head IC chip is in operation.

29. A method of increasing cooling of a head IC chip in a magnetic disc device comprising a magnetic head device including a slider having a magnetic head element and a suspension structure having one end supporting the slider, a head IC chip which is a separately-formed component from the slider, a rotatable magnetic disc which is rotated at least when the head IC chip is in operation, and an electrically conductive connecting device for establishing an electrical connection between the magnetic head element and the head IC chip, the method including the steps of:

mounting the head IC chip on the connecting device at a position so as to face the magnetic disc;

selecting the mounting position of the head IC chip to be located on the connecting device where the head IC chip is always exposed to a flow of air produced by rotations of the magnetic disc so that the head IC chip is continuously cooled by the flow of air at least when the head IC chip is in operation; and

arranging for the head IC chip to be located with respect to the magnetic disc with a distance between opposing surfaces of the head IC chip and the magnetic disc smaller than 1000 μm.